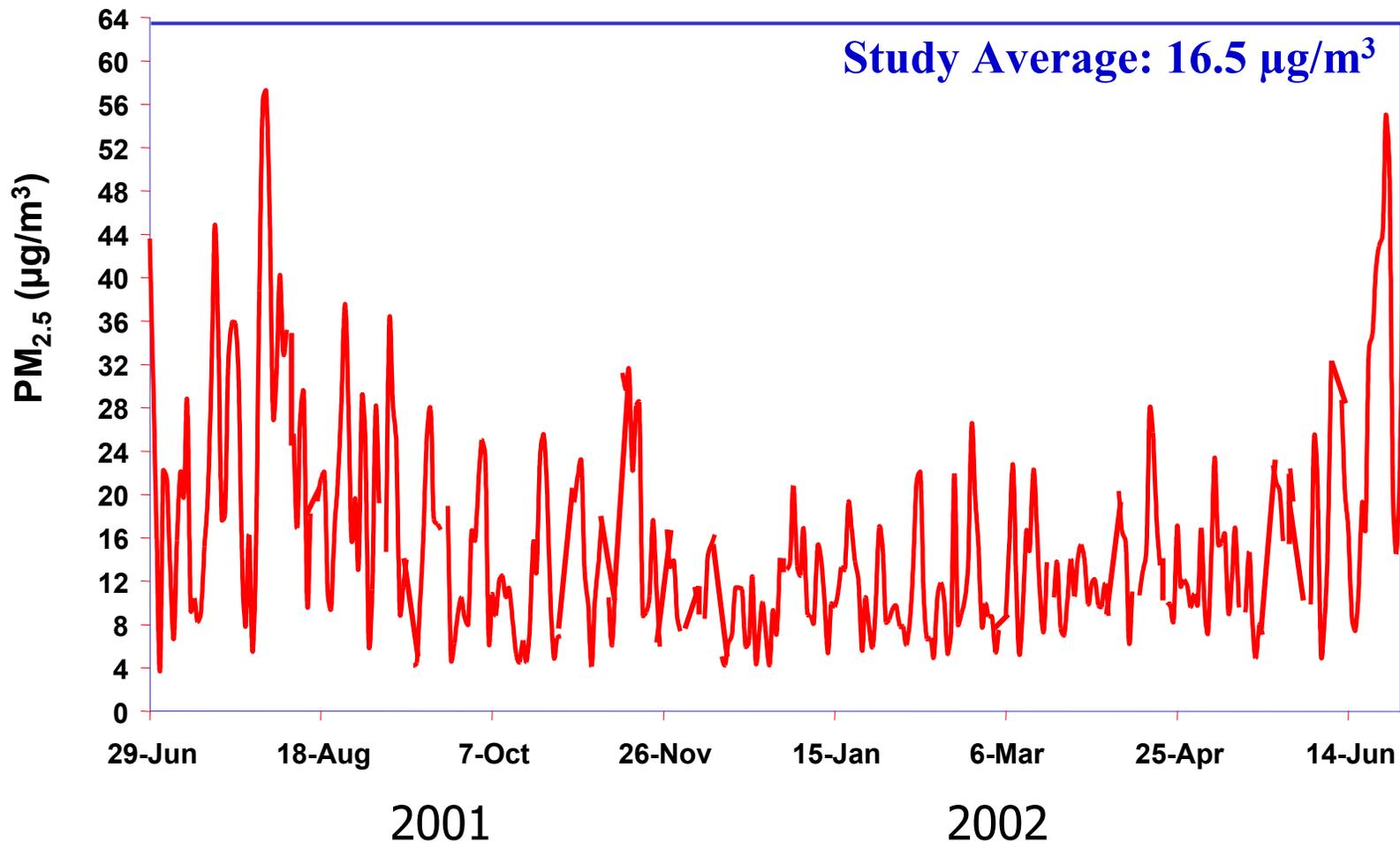


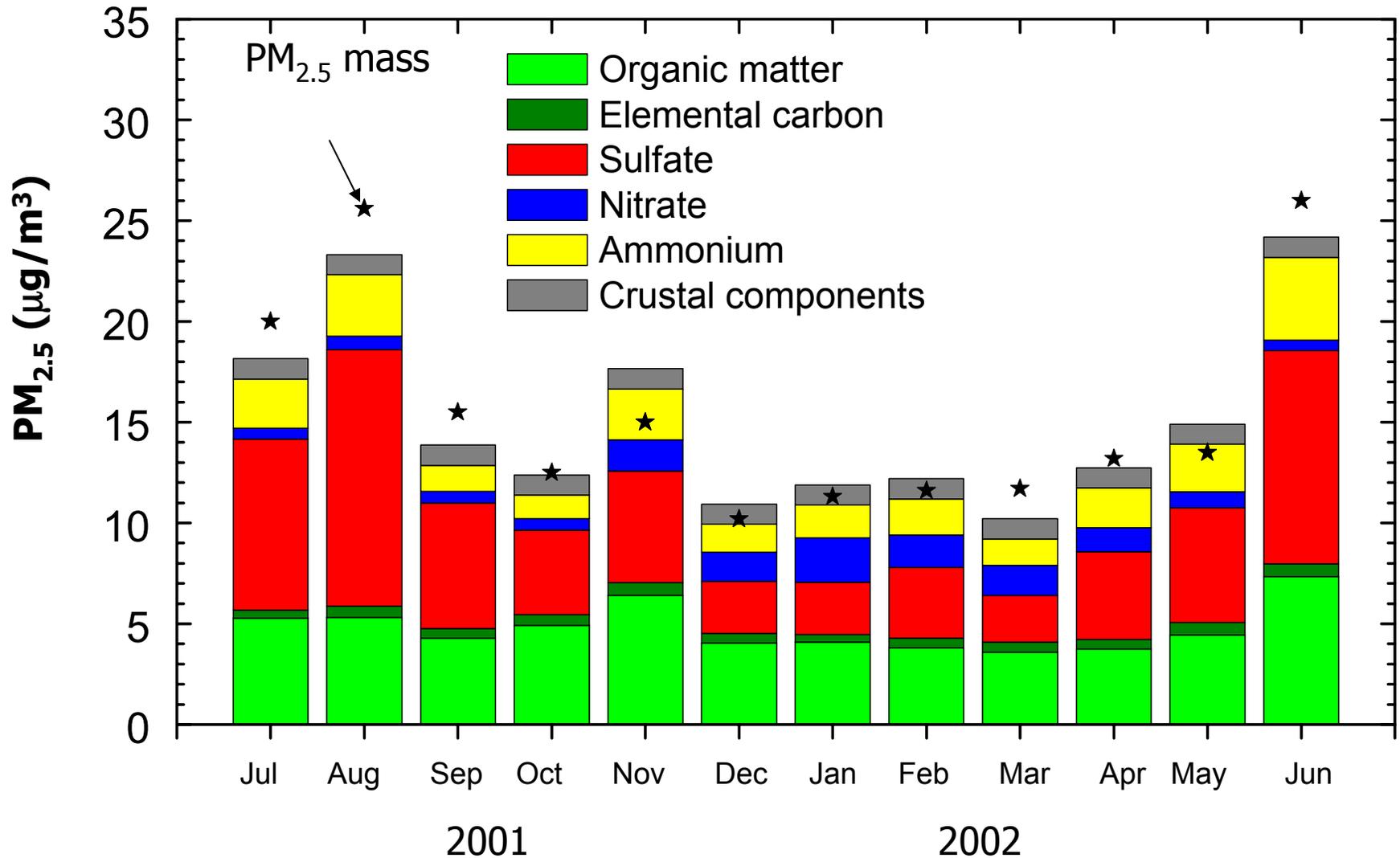
PM2.5 Concentrations and Composition in Pittsburgh

Summary of ambient
measurements from Pittsburgh Air
Quality Study (PAQS)

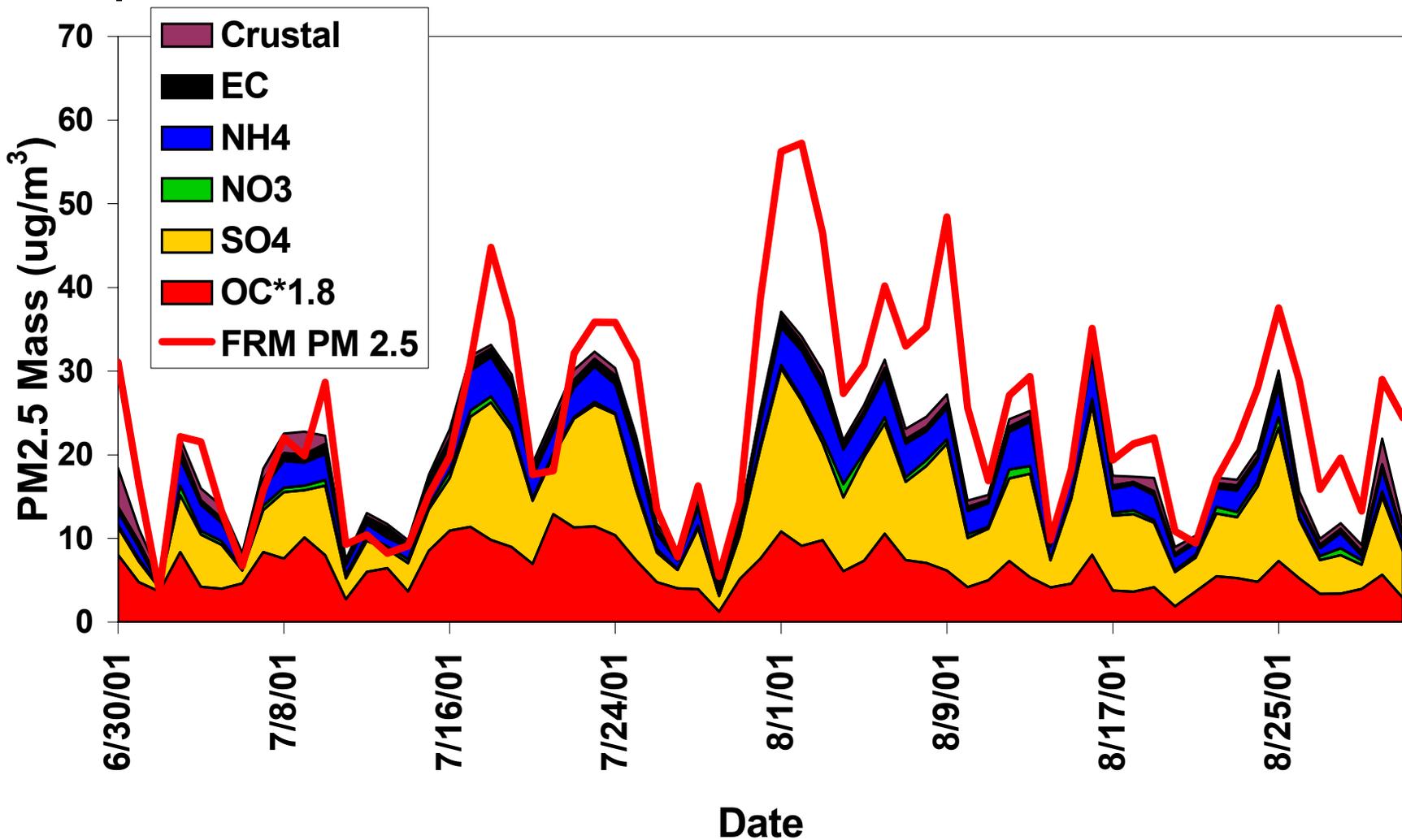
PM_{2.5} Concentrations During PAQS



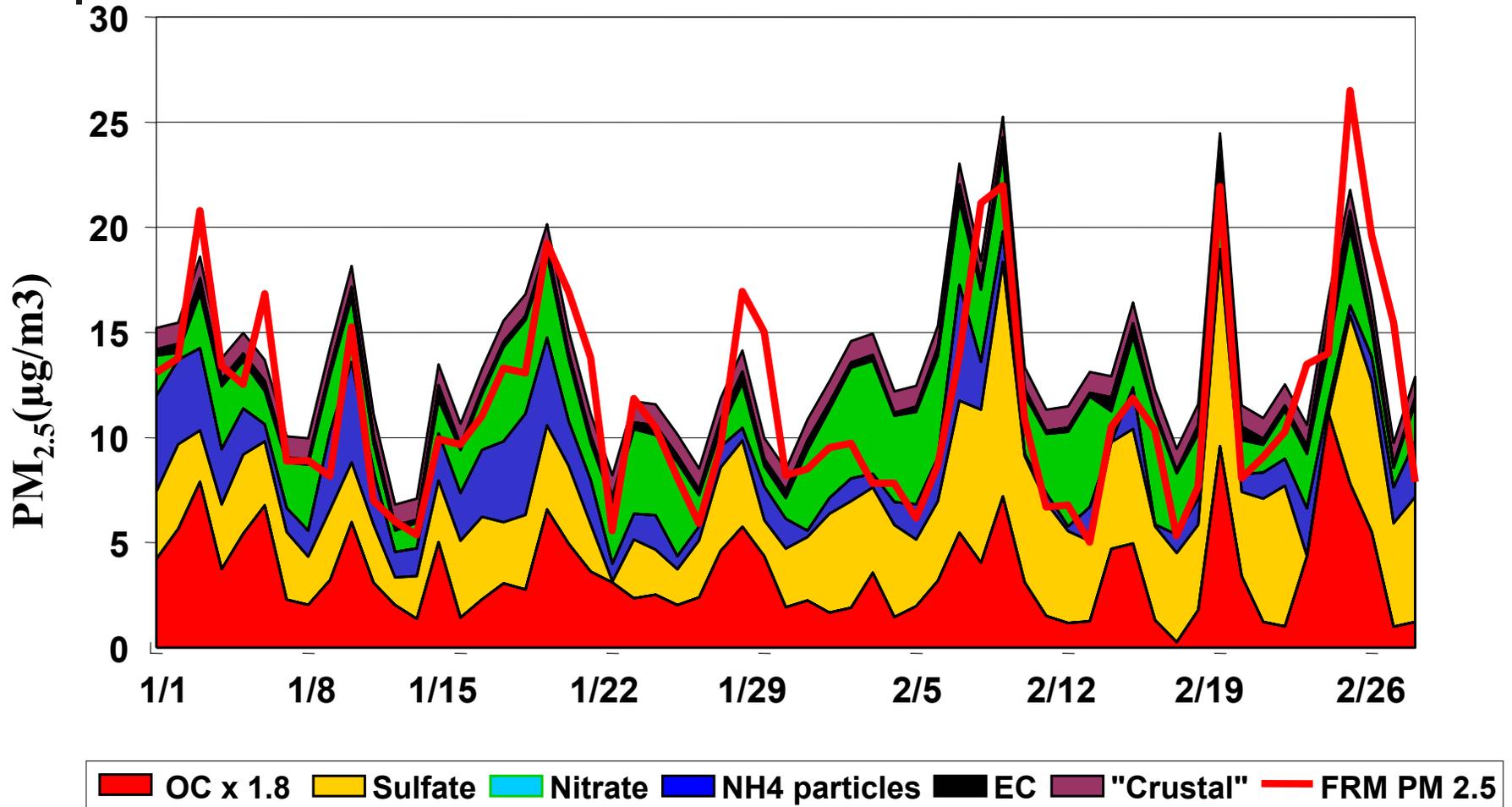
Fine PM Composition



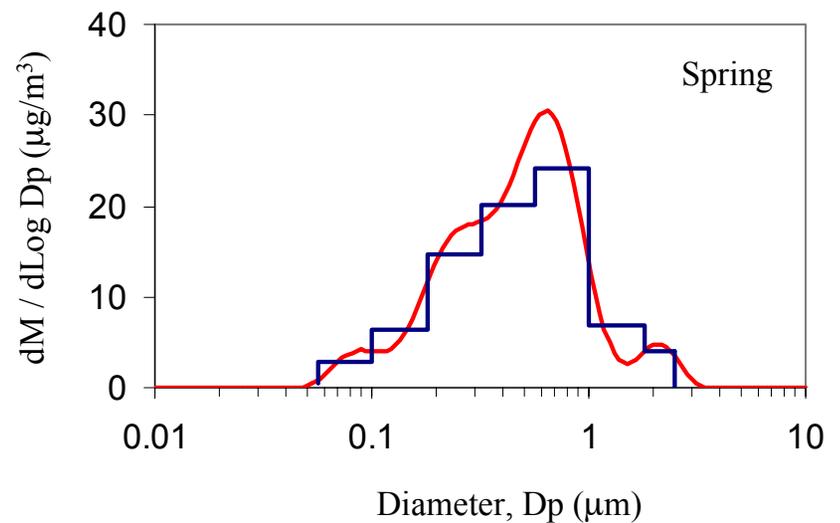
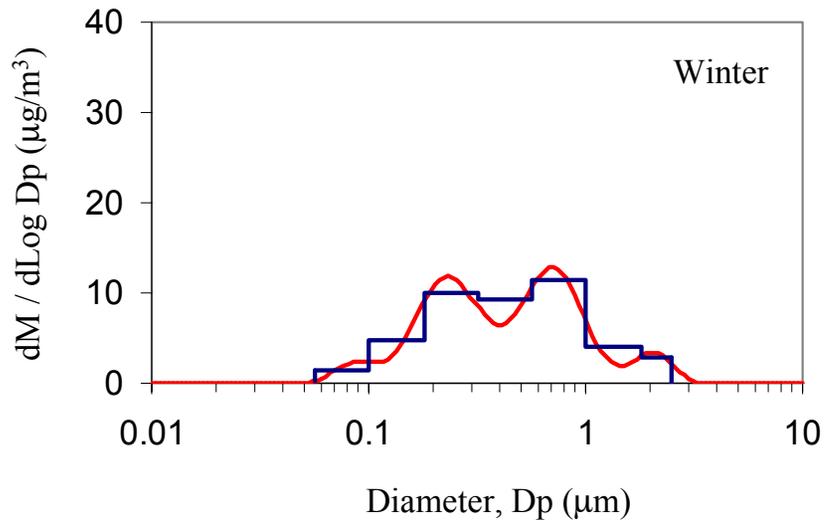
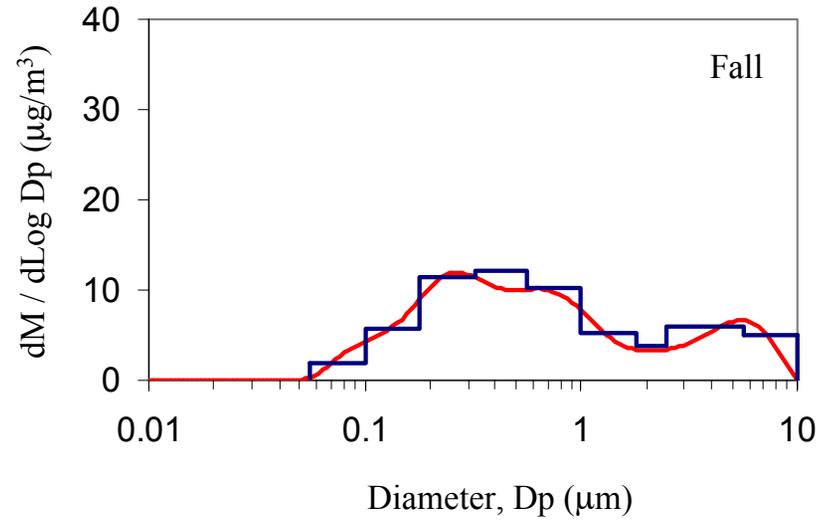
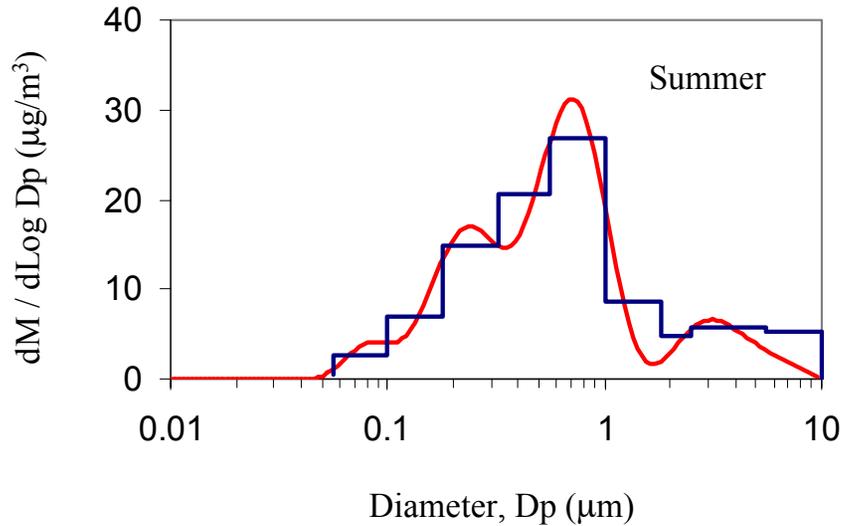
Fine PM Composition July-August 2001



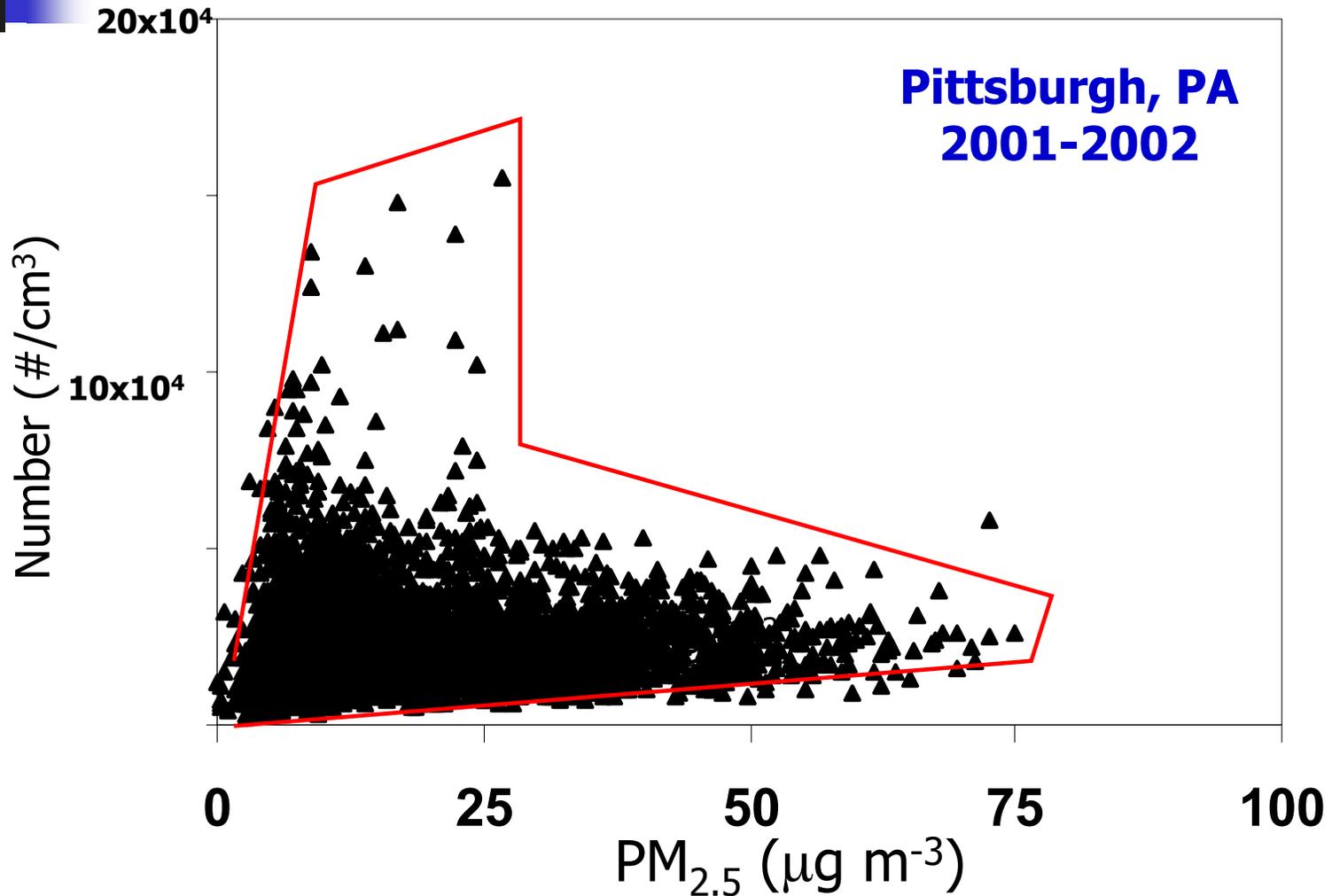
PM_{2.5} Mass Balance Jan-Feb 02



PM Mass Distributions

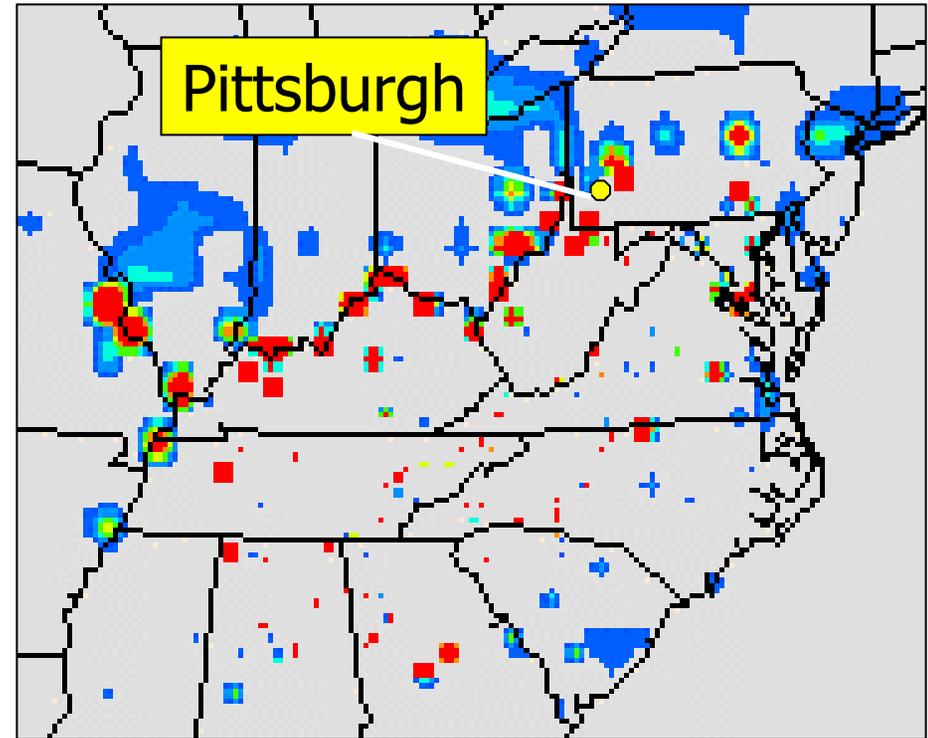
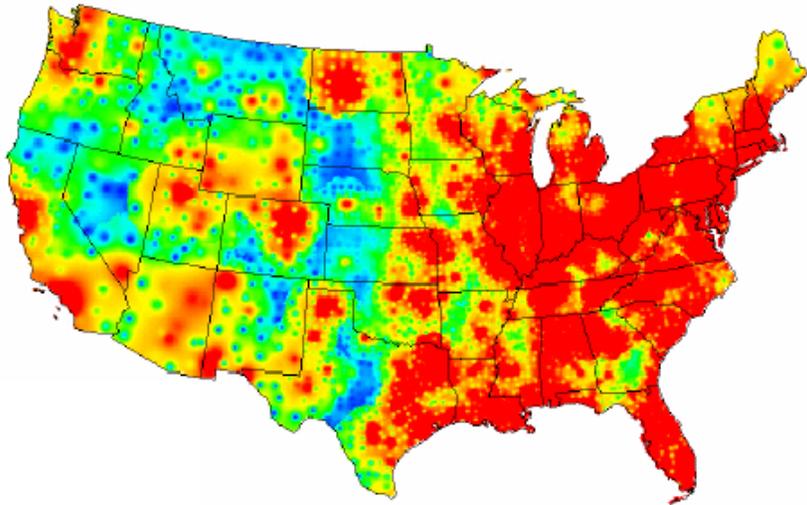


Aerosol Number and Mass

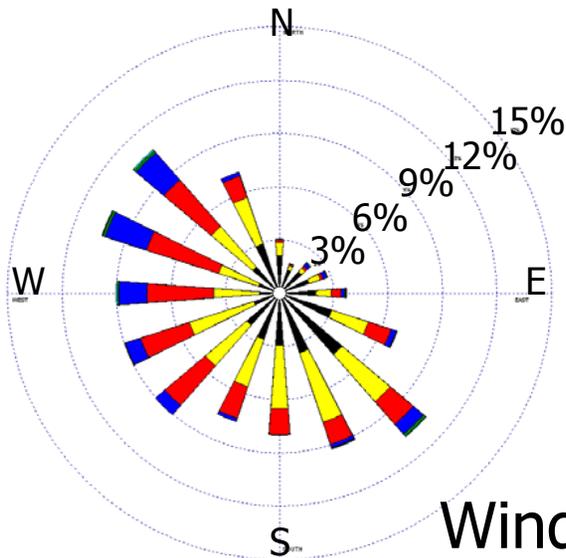
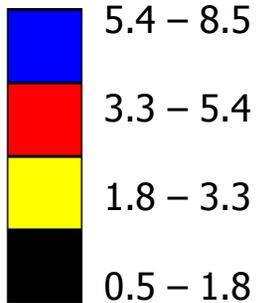


- Negative correlation related to nucleation activity

SO₂ Emissions in Eastern US



Wind speed
(m/s)



Wind direction and speed during PAQS

PAQS PM_{2.5} sulfate measurements

- Conventional (filter-based) method

- Most accurate
- 24-hour average resolution



- CMU Steam sampler

- 2nd most accurate
- 1 to 2-hour average resolution

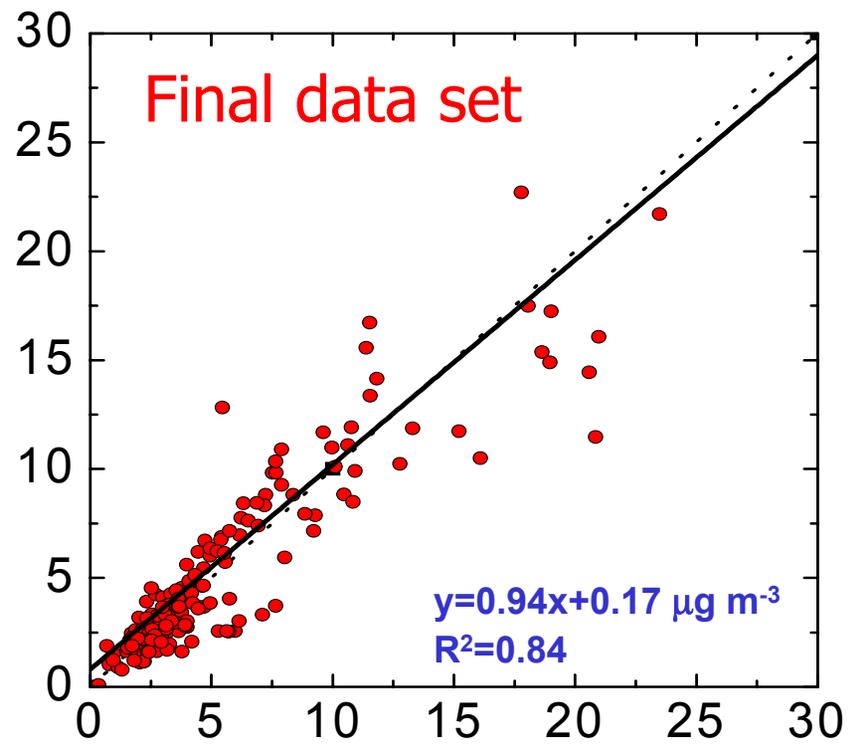
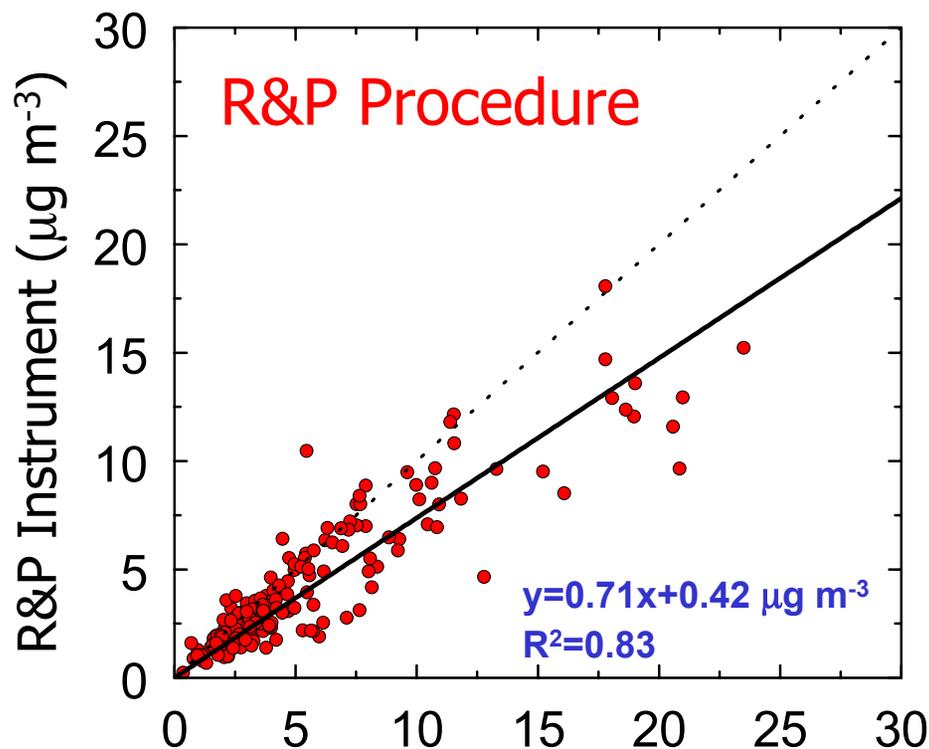


- R&P 8400 instrument

- Least accurate; requires more extensive data reduction than the other methods
- 10-min average resolution



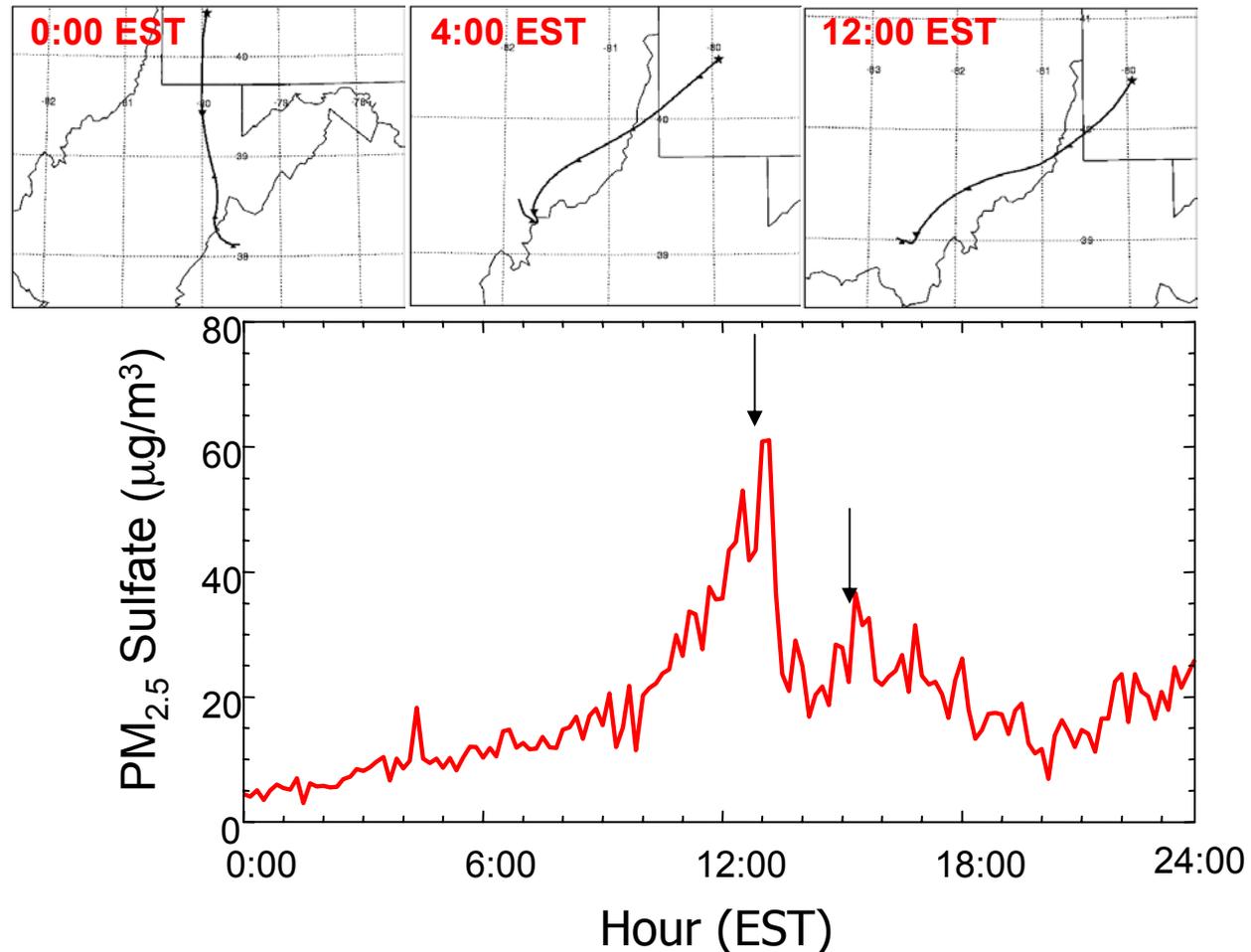
Correction of Continuous Sulfate Measurements



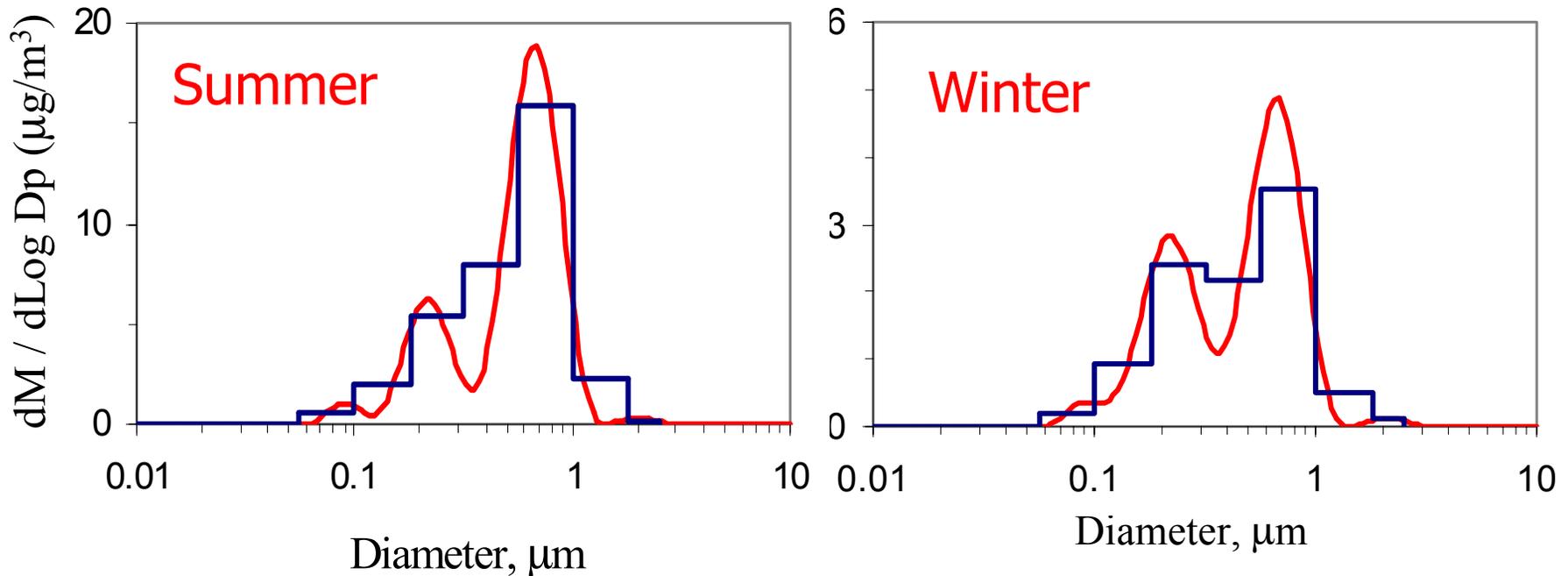
Filter-based Method ($\mu\text{g m}^{-3}$)

Continuous Sulfate Measurements

- July 26, 2002
($16.2 \mu\text{g m}^{-3}$)
- Increase as winds shift direction
- Decrease after a front passed, wind speeds decreased, and some rain fell

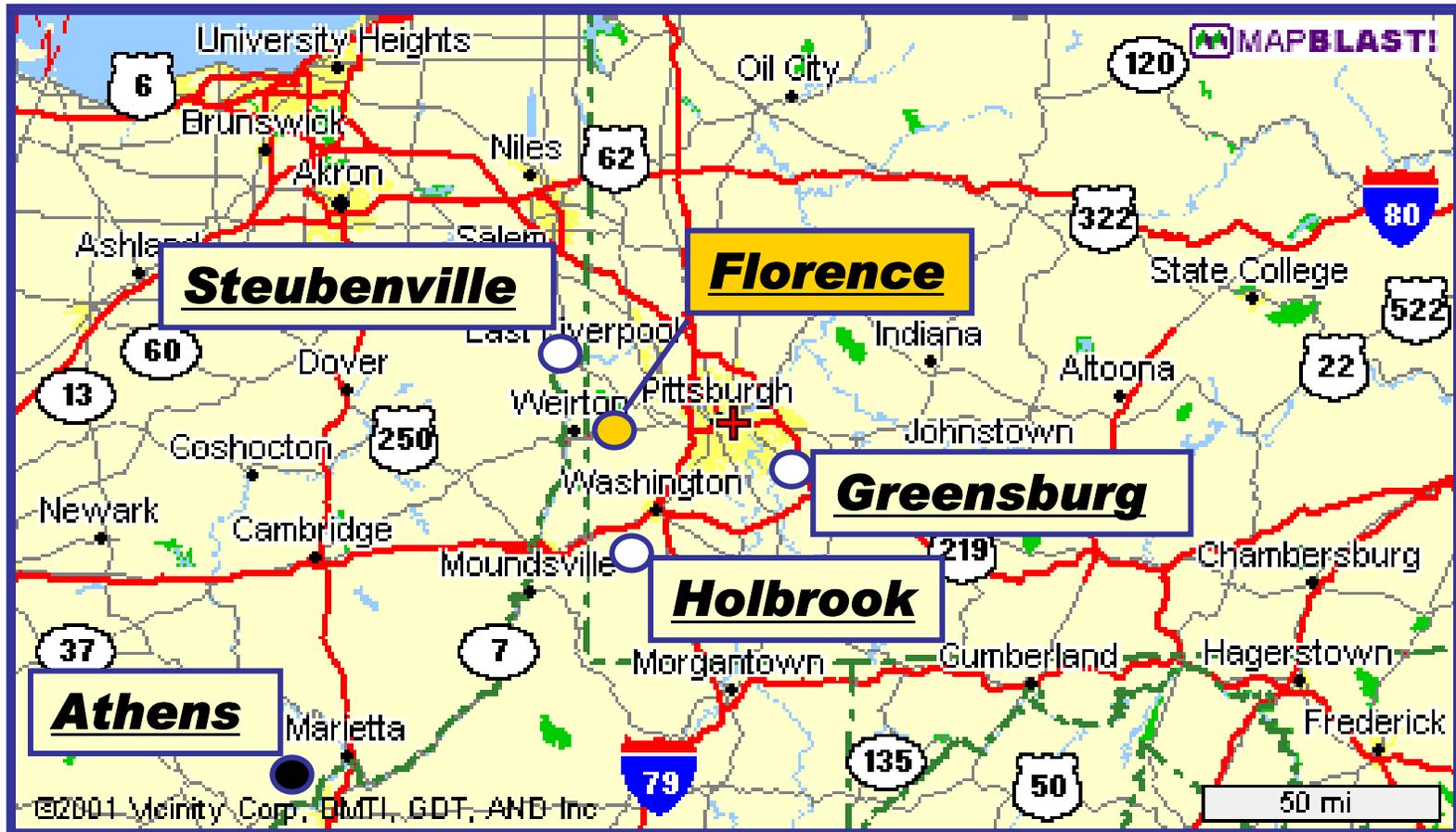


Sulfate Size Distributions

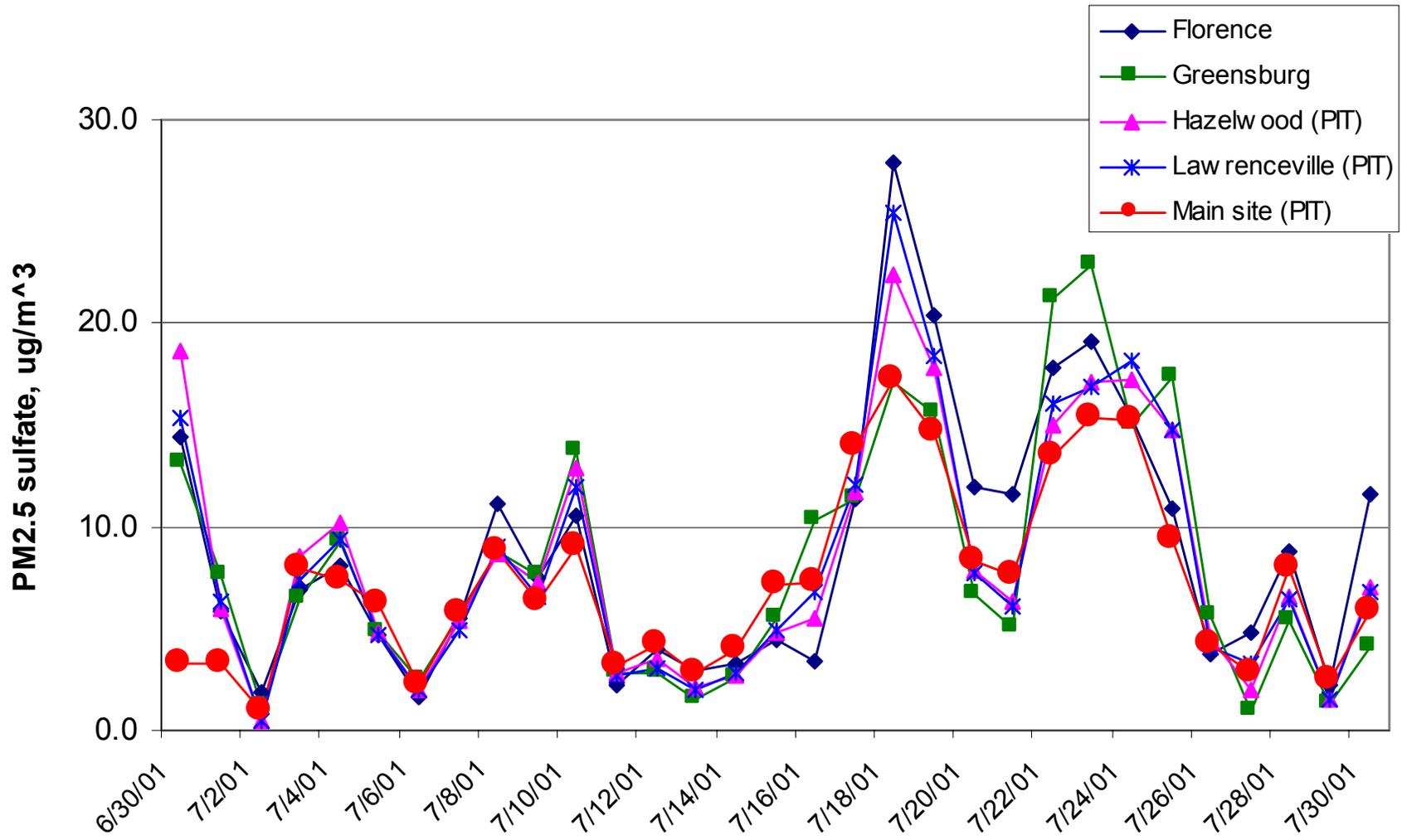


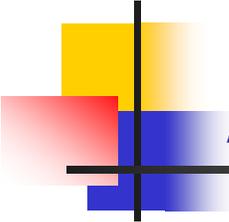
Cloud conversion of SO_2 to sulfate is a major pathway for both the summer and the winter in the Eastern US.

Satellite Sites Outside Pittsburgh

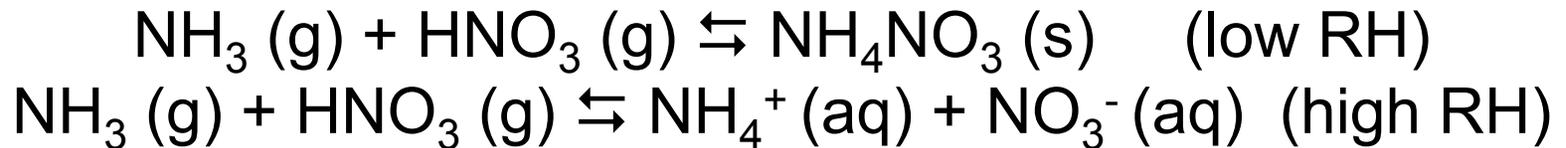


Sulfate Mass at Main Site and Satellite Sites



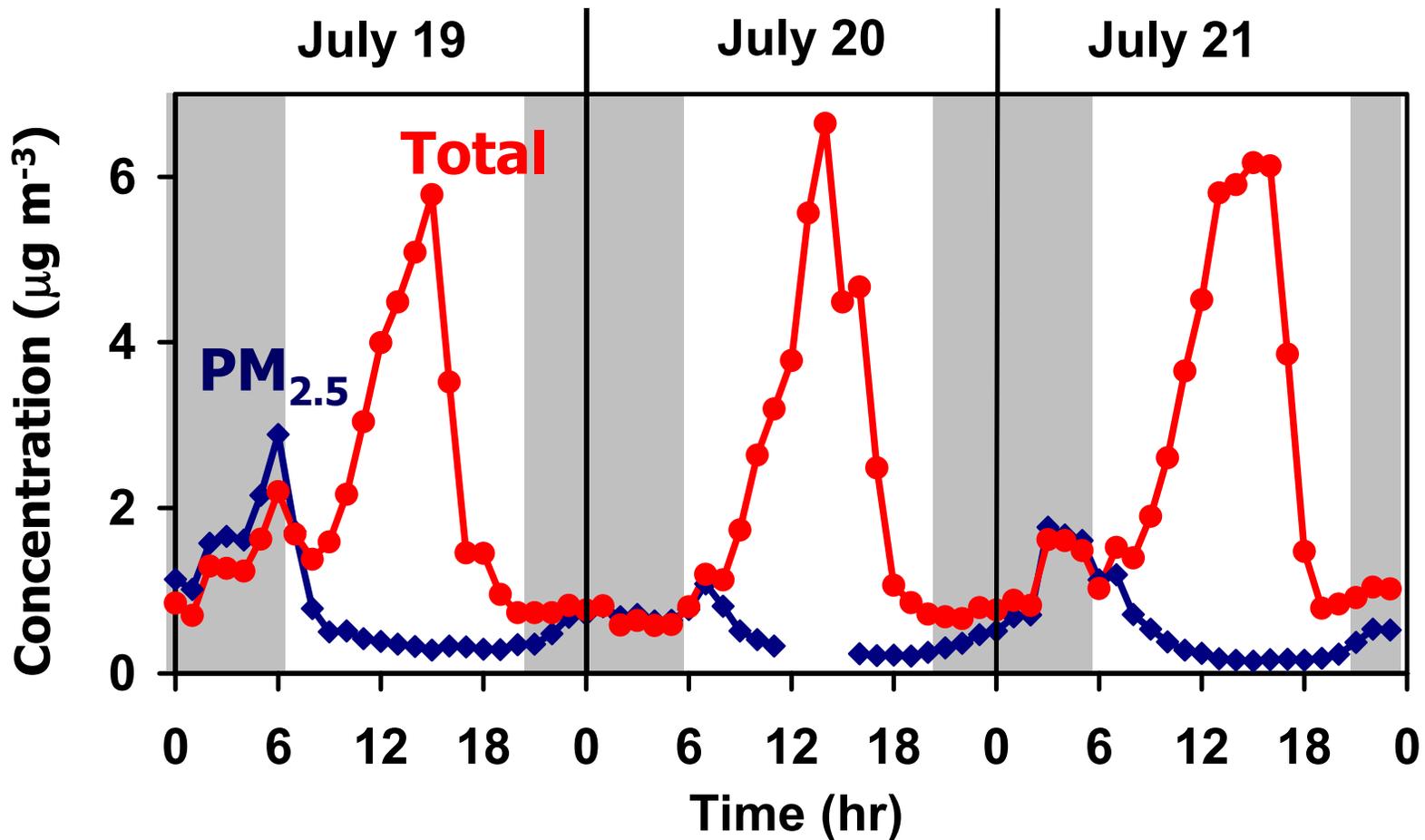


Ammonium Nitrate Formation



- The formation of ammonium nitrate requires
 - Nitric acid (major sources of NO_x in the US are transportation and power plants)
 - Free ammonia (ammonia not taken up by sulfate)
- The formation reaction is favored at:
 - Low temperatures (night, winter, fall, spring)
 - High relative humidity
- **Hypothesis:** A significant fraction of the sulfate reduced will be replaced by nitrate when SO₂ emissions are reduced.

Partitioning of PM_{2.5} nitrate



Diurnal Pattern in Total Ammonium

